

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
30 October 2003 (30.10.2003)

PCT

(10) International Publication Number
WO 03/089352 A1

(51) International Patent Classification⁷: **B65H 18/10**

(21) International Application Number: PCT/GB03/01628

(22) International Filing Date: 14 April 2003 (14.04.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0208688.2 16 April 2002 (16.04.2002) GB

(71) Applicant (*for all designated States except US*): **VALMET ATLAS PLC** [GB/GB]; Wolseley Road, Woburn Road Industrial Estate, Kempston, Bedford, Bedfordshire MK42 7XT (GB).

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **WINDO, Kevin, P** [GB/GB]; 2 Parkside, Milton Ernest, Bedfordshire MK44 1RG (GB).

(74) Agent: **KING, James, Bertram**; Kings Patent Agency Limited, 73 Farringdon Road, London, Greater London EC1M 3JQ (GB).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

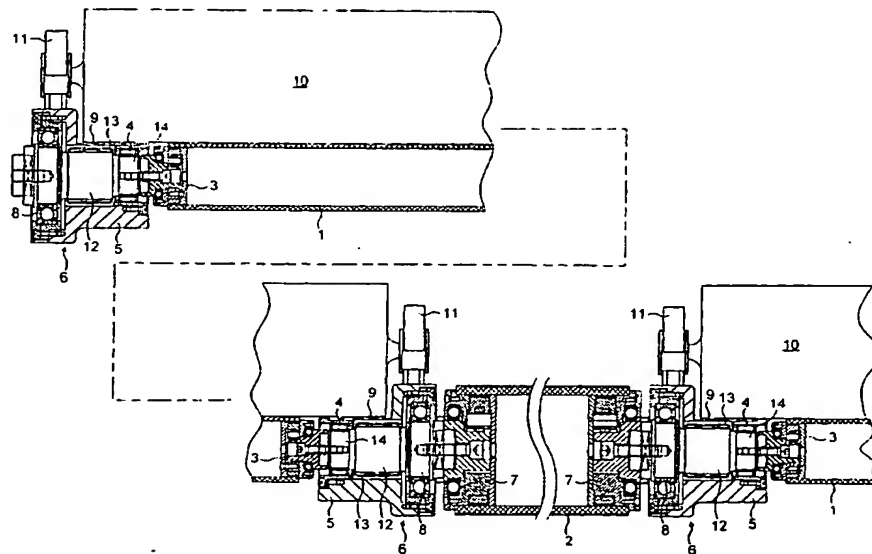
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **REWIND ARMS FOR PLASTIC FILM SLITTING APPARATUS**



(57) Abstract: A winding core (1) of small diameter is mounted at each end on a locking core chuck (3) coupled to a shaft (14) supported by spaced bearings (4) and (8) located within a housing part (5) at the free end (6) of a rewind arm structure. The central part of the shaft (14) has a pulley portion (12) over which a drive belt (13) runs. A larger core (2) is mounted at each end on a heavier duty locking core chuck (7) carried by larger bearings (8) which are located also within the housing (5). The housing (5) is cut away or stepped at (9) whereby a contact pressure roller (10) having a width greater than that of the core (1) may be accommodated and brought into contact with the core (1) at least at the minimum diameter thereof.

BEST AVAILABLE COPY

WO 03/089352 A1

Rewind arms for plastic film slitting apparatus.

This invention relates to rewind arms for holding winding cores onto
5 which plastics film is wound after processing on a slitter rewinder machine
wherein a wide film is slit into lesser widths and wound onto cores for further
use.

In such machines a wide roll of film is passed through a machine, cut or
slit with blades longitudinally and the slit widths rewound individually onto cores
10 using pairs of rewinding arms. There is a frequent requirement to rewind film
onto paper cores of various diameters according to market requirements.
Industrial standard core inside diameters are 76 mm and 152 mm. Slitter
rewinder machine which achieve this use individual contact rollers and in view
of the great variety of slit widths it is not practical to have a special length of
15 contact roller for each individual slit width. Each contact roller is therefore of an
extended length and the dimension of the top core holding zone of the rewind
arm has to be limited in size to avoid the contact roller touching the arm at the
overlaps each side of the core width. The design of the top of the rewind arm is
therefore limited in size by the minimum core diameter that the machine is
20 required to handle.

Hitherto machines have made use of two designs of rewind arms, one
design to handle a minimum core size of 76 mm and the other to handle a
minimum core of 152 mm diameters. This is due to the fact that a rewind top

dimension which is suitable to hold a 76 mm core has mechanical components which are limited in size being the drive shaft and bearings and which are therefore not strong enough to process very heavy rewind rolls. The heavy rewind rolls are usually produced using 152 mm (or larger) cores. Because of
5 the limited strength of a rewind arm for 76 mm cores, a minimum core internal diameter of 152 mm is often specified even though a capability of the machine to also handle 76 mm cores would be preferred.

An object of this invention is to provide a rewind arm for slitter rewinder machines which can accommodate different core diameters and which
10 minimises interference with a contact roller.

Another object of this invention is to provide a rewind arm for slitter rewinder machines which can provide large diameter shafts, bearings and core chucks of 152 mm ID (and larger) rewind cores and whilst retaining the capability of handling 76 mm cores.

15 Although this invention is primarily directed to slitter rewinder machines the construction may be adopted for other applications where winding of sheet materials onto a core is required using a machine which may be adapted to different width or diameter cores.

According to this invention there is provided a rewind arm assembly
20 primarily for a slitter rewinder machine of the kind having a base supporting two or more rewind arms in spaced relationship whereby a rewind core may be rotationally supported between two adjacent rewind arms, each arm having a core driving shaft for coupling with a core engaging and locking chuck, the shaft

being carried by spaced bearing assemblies located in a housing at the top of each rewind arm, the rewind arms being supported on the machine base in a manner permitting traversing and adjustment of the spacing to accommodate differing rewind core widths, the machine further including a pressure contact
5 roller which may be positioned in parallel, surface to surface, contact with a core and mounted on arms which pivot so as to accommodate the increasing core diameter as the core is wound during use, wherein one side of the top housing of the rewind arm has the core shaft and support bearings adapted to a first size of core internal diameter and the other side of the top of the rewind
10 arm has the core shaft and support bearings adapted to a second size of core internal diameter.

Preferably the housing includes two sets of shaft supports and bearings which to one side has a lesser dimension than the other at least in zone of contact by a contact roller.

15 The housing may have, at the side having the lesser dimension shaft supports and bearings, a stepped part of reduced external profile in the zone of a contact roller.

The contact roller may extend across the stepped part of the housing of the rewind arm without interference with or fouling of the arm when adjacent
20 arms are spaced less than the contact roller length to accommodate a core shorter than the contact roller.

Preferably each bearing assembly has a maximum circumferential dimension less than the diameter of a relevant core, the stepped part being

formed on the part of the housing embracing at least the bearing assembly for the lesser dimension shaft, the stepped part comprising a planar face of the housing extending parallel to the core axis and tangential to the point of contact between the contact roller and core.

5 In one preferred construction the one side of the top housing of the rewind arm is coextensive with the side of the arm and includes a core shaft and support bearings adapted to a first size of core internal diameter and the other side of the housing has the core shaft and support bearings adapted to a second size of core internal diameter, the core shafts being connected through
10 a central pulley located within the housing and coupled through a drive belt with a motor housed in the base of the arm for the purpose of rotating the core shafts. Preferably the drive belt and pulley are toothed.

In the above case the stepped part may extend across the zone of the pulley.

15 This invention also relates to a slitter rewinder machine wherein a wide film is slit into lesser widths and wound onto cores for further use, said machine incorporating at least two rewind arms, in accordance with any preceding claim, for holding a winding core.

Thus, and according to this invention, the rewind arm assembly has one
20 side of the top of the rewind arm with a core shaft and support bearings adapted to a first size of core internal diameter and the other side of the top of the rewind arm has core shaft and support bearings adapted to a second size of core internal diameter.

With this construction the top of the rewind arm may thus have a housing for the two sets of shaft supports and bearings which to one side has a lesser dimension than the other at least in zone of the contact roller. The top housing thus being stepped. This allows the contact roller to extend laterally beyond the top part of the support arm without interference with or fouling the arm when a smaller diameter core is being wound. Naturally the contact roller can only extend widthways up to the steps on each support arm but nevertheless this means that a single contact roller may be used with a range of slit widths for smaller size cores.

This invention, and further and preferred features thereof are described in conjunction with the drawings showing one embodiment by way of an example. In the drawings:

Fig. 1 shows a longitudinal section through two diameters of core mounted on support arms of a slitter rewinder machine according to this invention,

Fig. 2 shows an end view of a smaller diameter core and support arm,

Fig. 3 shows an end view of a larger diameter core and support arm,

Fig. 4 shows one support arm in side elevation and viewed from the right as shown in Fig. 1, and

Fig. 5 shows a sectional view on the line X - X as shown in Fig. 4.

The drawings do not illustrate complete details of the machine but only show the ends of the rewind arms and associated parts relevant to this invention.

Referring to the drawings, and initially to Figs. 1 to 3 there is shown a
5 winding core 1 of 76 mm diameter and a winding core 2 of 152 mm diameter.
The core 1 is mounted at each end on a locking core chuck 3 coupled to a shaft 14 supported by spaced bearings 4 and 8 located within a housing part 5 at the free end 6 of a rewind arm structure. The central part of the shaft 14 has a pulley portion 12 over which a drive belt 13 runs with the other end coupled to a
10 drive means. The arm 6 is generally mounted on the bed of the machine and in a manner permitting swinging movement of the core in a direction perpendicular to the core axis of rotation. The larger core 2 is mounted at each end on a heavier duty locking core chuck 7 carried by larger bearings 8 which are located also within the housing 5.

15 The housing 5 is cut away or stepped at 9 whereby a contact pressure roller 10 having a width greater than that of the core 1 may be accommodated and brought into contact with the core 1 at least at the minimum diameter thereof. The contact roller 10 is supported on a pressure arm assembly 11 not shown here in detail. The stepped part 9 of the housing 5 on each arm enables
20 a larger and more substantial bearing assembly 8 to be provided for the larger diameter cores 2 whilst retaining a common drive shaft arrangement. In the drawings the core 2 is shown as idle that is the relevant pressure roller and pressure arm assembly is not shown.

To change from smaller to larger diameter cores does not require a

change to be made to the rewind arms 6 themselves but the arms need only be moved laterally or reversed to accommodate the required core size. The cores 2 can be used with wider contact rollers 10 which will then overlie the housings 5 without interference.

5 A slitter rewinder machine may include all of the arms 6 in accordance with this invention or some arms only may be provided.

It will be understood that parts of the slitter rewinder machine are not described as these are known in the art and do not form an essential part of this invention other than in combination with the rewind arms described.

10 In order to explain further the way the construction described is put into practice reference is now made to Figs. 4 and 5 of the drawings. Fig. 4 shows one rewind arm 6 in side elevation and viewed from the right as shown in Fig. 1. Fig. 5 is a sectional view on the line X-X shown in Fig. 4. The reference numerals generally indicate the same parts as those used in Figs 1 to 3.

15 The rewind arm 6 shown is mounted on a transverse support beam 40 forming part of the machine bed and is supported on rails 41 by runners 42 permitting the arm to be moved along the beam 40 by a drive motor 43 to a selected core engaging position or an idle position if the arm is not in use. The core 1 is driven via the chuck 3 through a drive belt 13 running over the pulley
20 12 within the housing 5 and engaging a pulley 45 within the lower end of arm 6 the pulley being driven through a gear set by a motor 46. The pressure roller 10 is permitted to contact the core 1 through the stepped portion 9 of the housing 5.

CLAIMS:

1. A rewind arm assembly primarily for a slitter rewinder machine of the kind having a base supporting two or more rewind arms in spaced relationship whereby a rewind core may be rotationally supported between two
5 adjacent rewind arms, each arm having a core driving shaft for coupling with a core engaging and locking chuck, the shaft being carried by spaced bearing assemblies located in a housing at the top of each rewind arm, the rewind arms being supported on the machine base in a manner permitting traversing and adjustment of the spacing to accommodate
10 differing rewind core widths, the machine further including a pressure contact roller which may be positioned in parallel, surface to surface, contact with a core and mounted on arms which pivot so as to accommodate the increasing core diameter as the core is wound during use, wherein one side of the top housing of the rewind arm has the core
15 shaft and support bearings adapted to a first size of core internal diameter and the other side of the top of the rewind arm has the core shaft and support bearings adapted to a second size of core internal diameter.

2. A rewind arm assembly in accordance with claim 1, wherein the housing includes two sets of shaft supports and bearings which to one side has a
20 lesser dimension than the other at least in zone of contact by a contact roller.

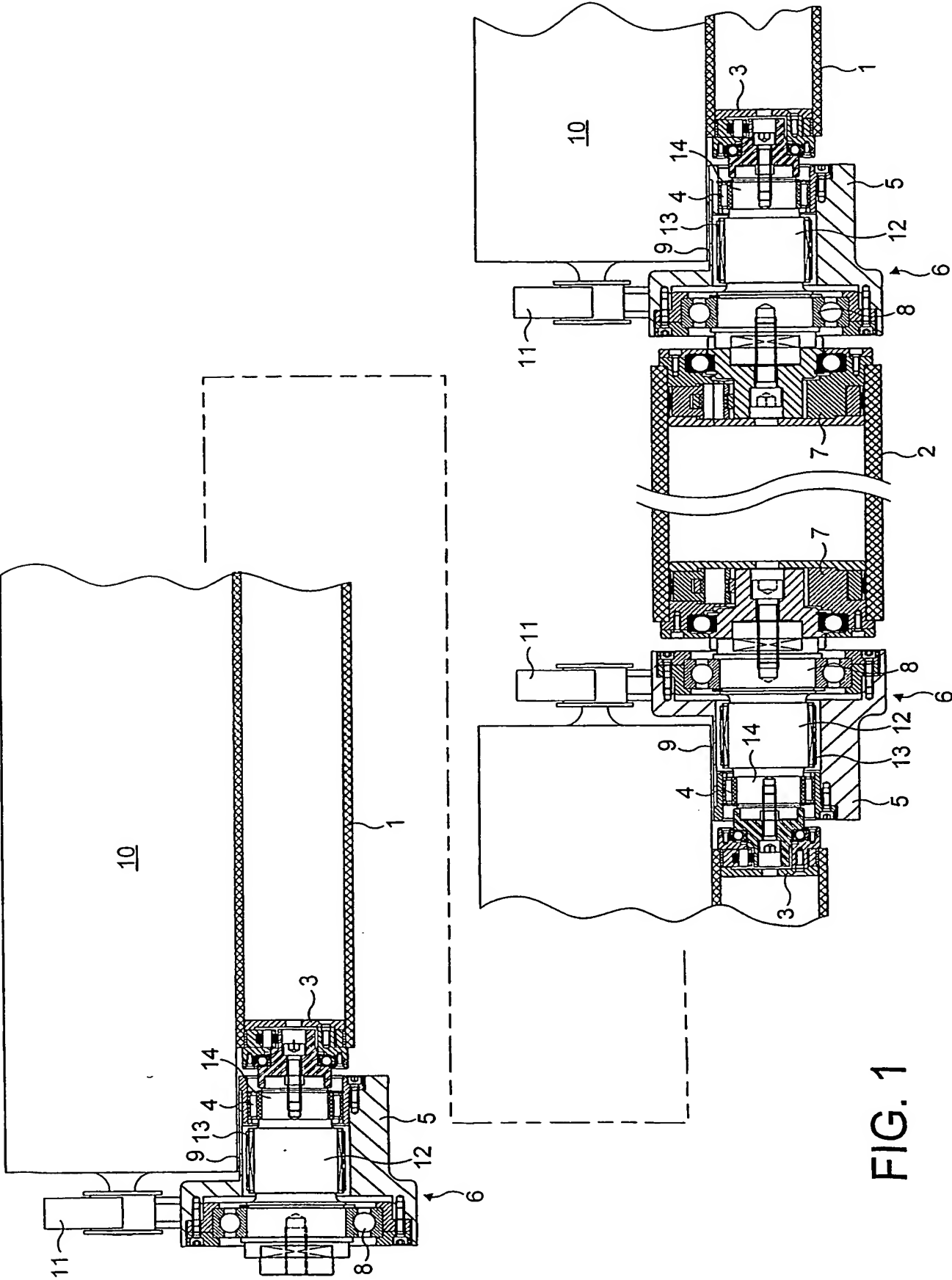
3. A rewind arm assembly in accordance with claim 2, wherein the housing at the side having the lesser dimension shaft supports and bearings has a stepped part of reduced external profile in the zone of contact by a contact

roller.

4. A rewind arm assembly in accordance with claim 3, wherein the contact roller may extend across the stepped part of the housing of the rewind arm without interference with or fouling of the arm when adjacent arms are spaced less than the contact roller length to accommodate a core shorter than the contact roller.
5. A rewind arm assembly in accordance with claim 3 or 4, wherein each bearing assembly has a maximum circumferential dimension less than the diameter of a relevant core, the stepped part being formed on the part of the housing embracing at least the bearing assembly for the lesser dimension shaft, the stepped part comprising a planar face of the housing extending parallel to the core axis and tangential to the point of contact between the contact roller and core.
6. A rewind arm assembly in accordance with any preceding claim, wherein the one side of the top housing of the rewind arm is coextensive with the side of the arm and includes a core shaft and support bearings adapted to a first size of core internal diameter and the other side of the housing has the core shaft and support bearings adapted to a second size of core internal diameter, the core shafts being connected through a central pulley located within the housing and coupled through a drive belt with a motor housed in the base of the arm for the purpose of rotating the core shafts.
7. A rewind arm assembly in accordance with claim 6, wherein the drive belt and pulley are toothed.

8. A rewind arm assembly in accordance with claim 3, 4 or 5 as further limited by claim 6 or 7, wherein the stepped part extends across the zone of the pulley.
9. A slitter rewinder machine wherein a wide film is slit into lesser widths and wound onto cores for further use, said machine incorporating at least two rewind arms, in accordance with any preceding claim, for holding a winding core.
10. A rewind arm assembly or a slitter rewinder machine incorporating such an assembly constructed as herein described and exemplified and as shown in the drawings.

FIG. 1



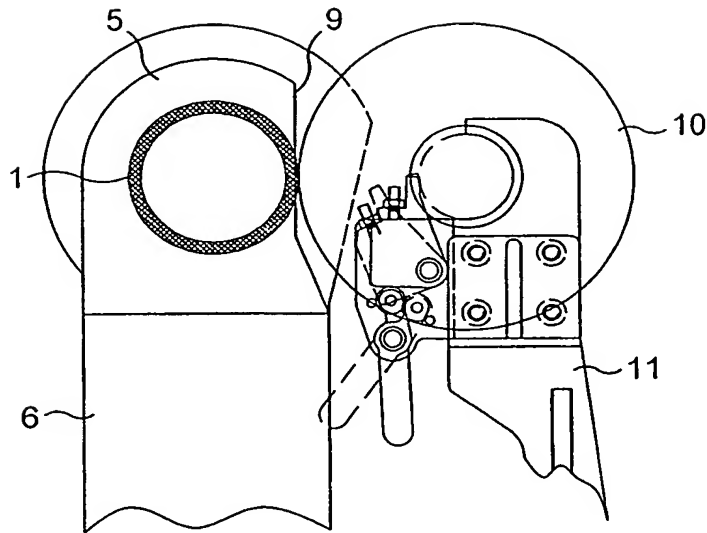


FIG. 2

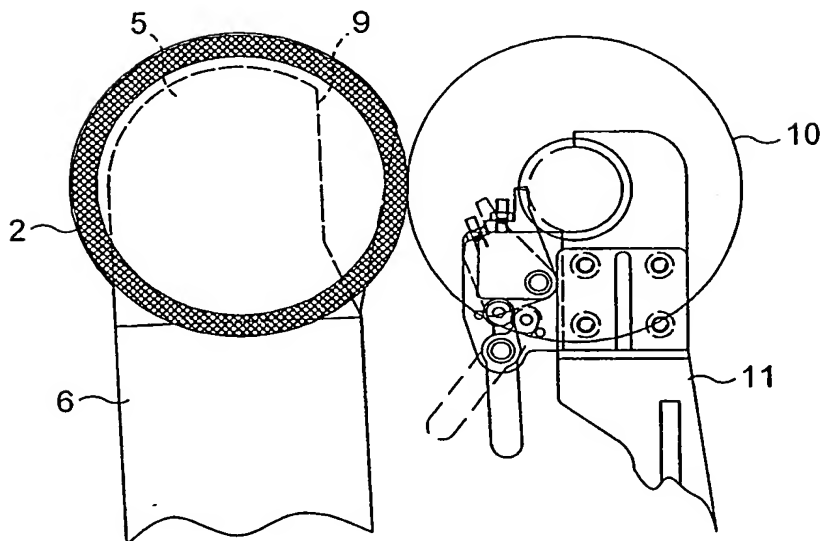


FIG. 3

3 / 4

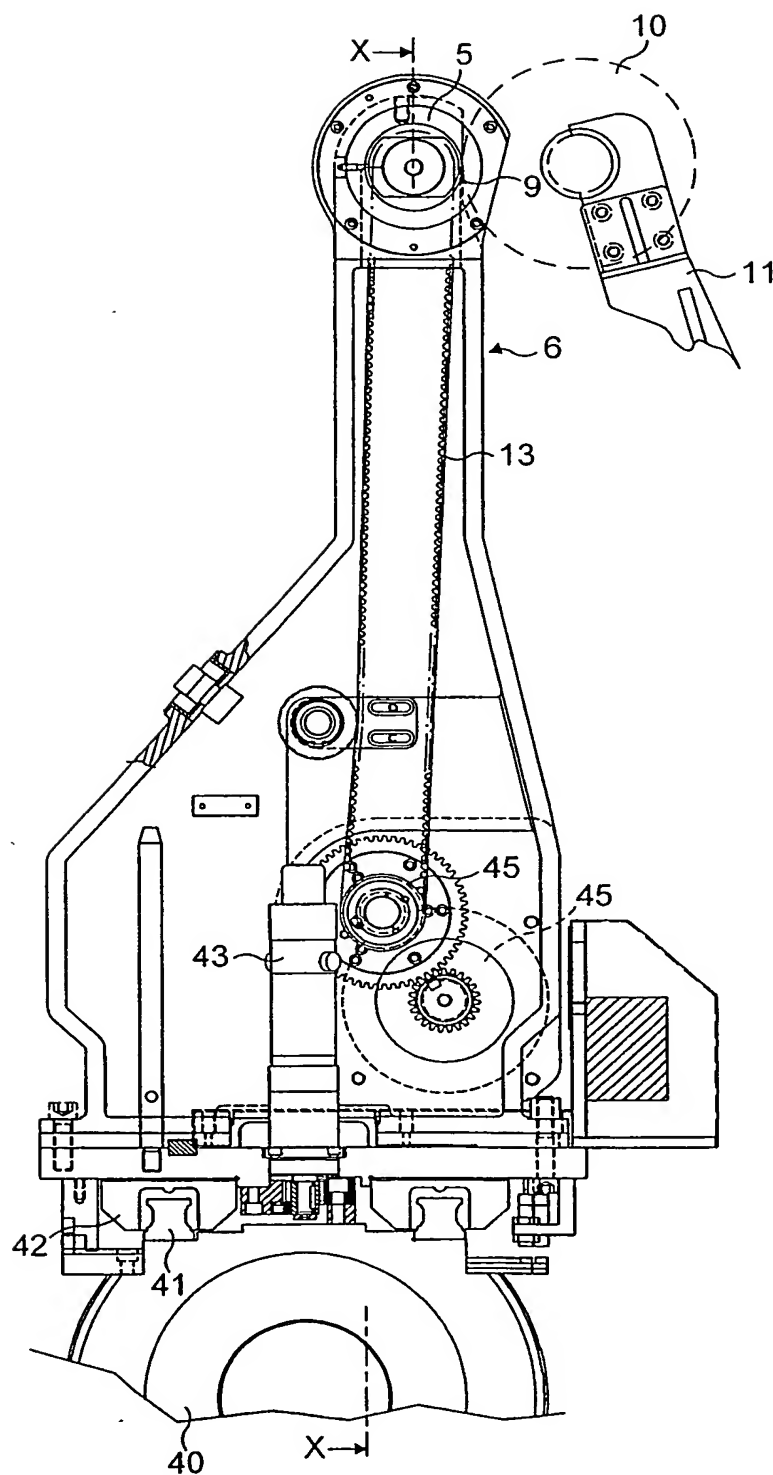


FIG. 4

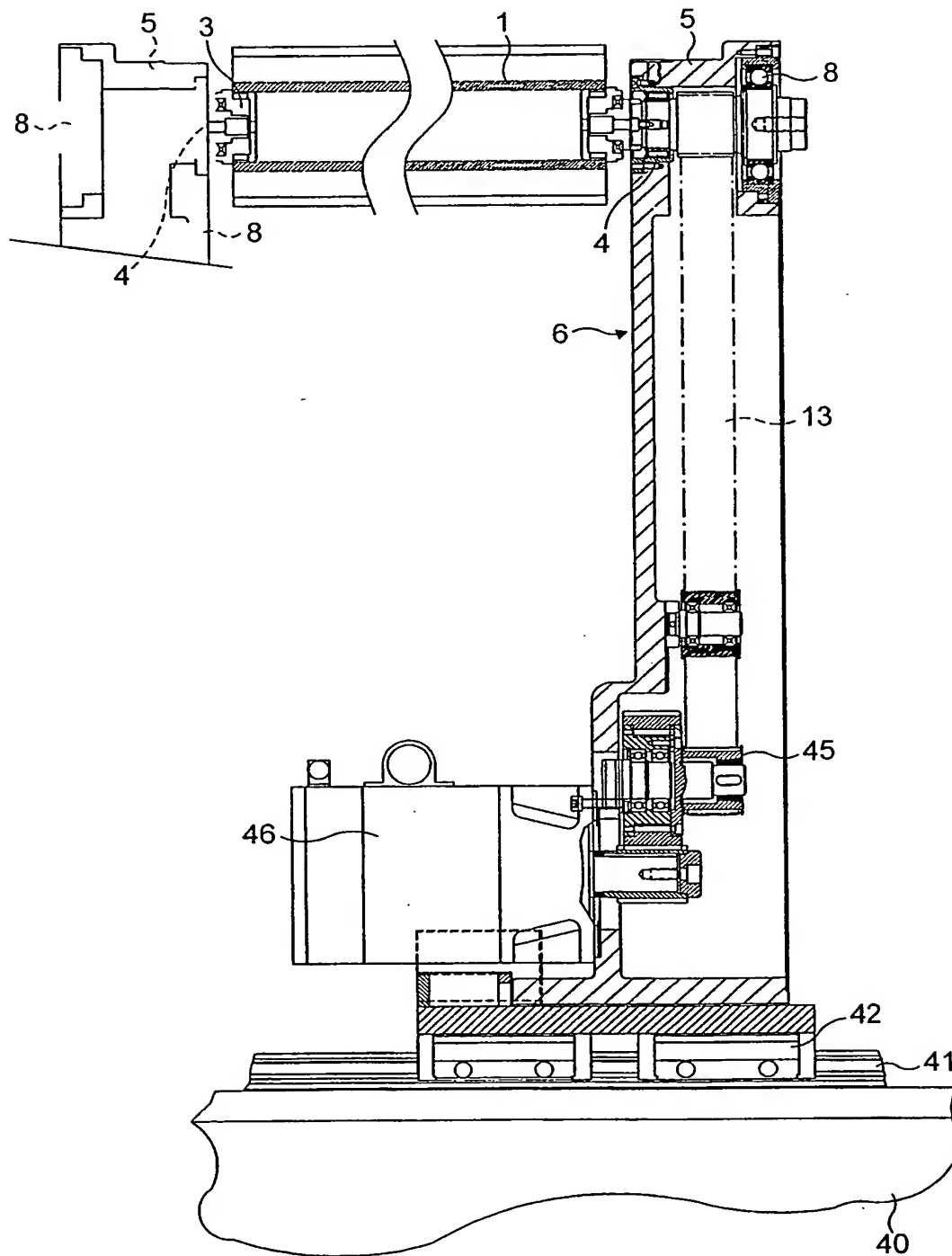


FIG. 5

INTERNATIONAL SEARCH REPORT

Internat Application No

PCT/GB 03/01628

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65H18/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 620 151 A (UEYAMA MINORU ET AL) 15 April 1997 (1997-04-15) column 6, line 55 - line 63; figure 4 column 7, line 20 - line 53; figure 2	1
A	EP 0 887 293 A (VOITH SULZER FINISHING GMBH) 30 December 1998 (1998-12-30) claim 1	1
A	FR 2 610 309 A (KRIEGER THEODORE) 5 August 1988 (1988-08-05) page 2, line 18 - line 24; figures	1
A	US 4 722 490 A (DOERFEL GERHARD W) 2 February 1988 (1988-02-02) column 1, line 7 - line 14	1

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

4 August 2003

Date of mailing of the international search report

19/08/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Haaken, W

INTERNATIONAL SEARCH REPORT

information on patent family members

Internal Application No
PCT/GB 03/01628

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5620151	A	15-04-1997	JP 2033764 C	19-03-1996
			JP 6234444 A	23-08-1994
			JP 7053547 B	07-06-1995
			JP 2545331 B2	16-10-1996
			JP 7017659 A	20-01-1995
			JP 7024779 A	27-01-1995
			DE 4403330 A1	11-08-1994
			GB 2274835 A , B	10-08-1994
EP 0887293	A	30-12-1998	DE 19727327 A1	07-01-1999
			DE 59806149 D1	12-12-2002
			EP 0887293 A2	30-12-1998
FR 2610309	A	05-08-1988	FR 2610309 A1	05-08-1988
US 4722490	A	02-02-1988	DE 3542633 A1	04-06-1987
			CA 1277300 C	04-12-1990
			EP 0224898 A1	10-06-1987
			JP 1802957 C	26-11-1993
			JP 5007298 B	28-01-1993
			JP 62130960 A	13-06-1987

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☒ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.